FIG. 1

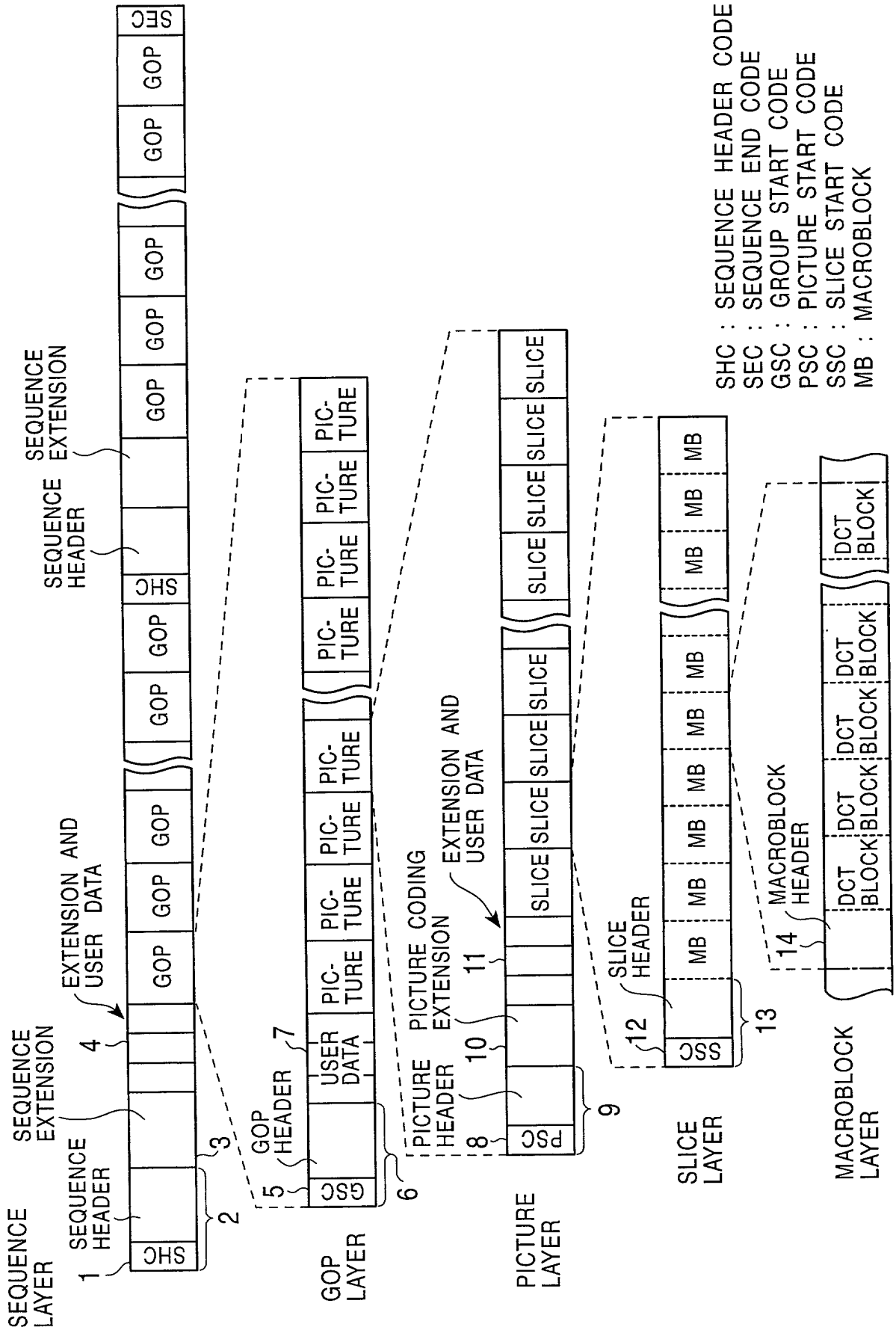


FIG. 2

CODE	NUMBER OF BITS	DESCRIPTION
sequence header code	32	SEQUENCE HEADER CODE
horizontal size value	12	LOWER 12 BITS OF THE NUMBER OF HORIZONTAL PIXELS
vertical size value	12	LOWER 12 BITS OF THE NUMBER OF VERTICAL LINES
aspect ratio information	4	PIXEL ASPECT RATIO INFORMATION
frame rate code	4	FRAME RATE CODE
bit rate value	18	LOWER 18 BITS OF BIT RATE (FOR UNITS OF 400 BITS)
vbv buffer size value	10	LOWER 10 BITS OF VBV BUFFER SIZE
intra quantiser matrix [64]	8*64	INTRA MB QUANTIZER MATRIX VALUE
non intra quantiser matrix [64]	8*64	NON-INTRA MB QUANTIZER MATRIX VALUE

FIG. 3

CODE	NUMBER OF BITS	DESCRIPTION
extension start code	32	START SYNCHRONIZATION CODE OF EXTENSION DATA
extension start code identifier	4	INDICATES WHICH EXTENSION DATA IS TRANSMITTED
profile and level indication	8	INDICATION OF PROFILE AND LEVEL
progressive sequence	1	INDICATES PROGRESSIVE SCAN
chroma format	2	CHROMA FORMAT SETTING
horizontal size extension	2	UPPER 2 BITS OF THE NUMBER OF HORIZONTAL PIXELS OF PICTURE
vertical size extension	2	UPPER 2 BITS OF THE NUMBER OF VERTICAL LINES OF PICTURE
bit rate extension	12	UPPER 12 BITS OF BIT RATE VALUE
marker bit	1	PREVENTS START CODE EMULATION
vbv buffer size extension	8	UPPER 8 BITS OF VBV BUFFER SIZE
low delay	1	INDICATING THAT B-PICTURE IS NOT INCLUDED
frame rate extension n	2	FRAME RATE EXTENSION
frame rate extension d	5	FRAME RATE EXTENSION
next start code ()		

FIG. 4

CODE	NUMBER OF BITS	DESCRIPTION
extension data (0)		EXTENSION DATA (0)
sequence display extension ( )		SEQUENCE DISPLAY ( )
sequence scalable extension ( )		SEQUENCE SCALABLE EXTENSION ( )
extension start code identifier	4	SEQUENCE SCALABLE EXTENSION ID
scalable mode	2	SCALABILITY MODE
layer id	4	LAYER ID OF SCALABLE LAYER
FOR SPATIAL SCALABILITY		
lower layer prediction horizontal size	14	HORIZONTAL SIZE OF LOWER LAYER PREDICTION
lower layer prediction vertical size	14	VERTICAL SIZE OF LOWER LAYER PREDICTION
vertical subsampling factor n	5	VERTICAL UPSAMPLING FACOR
FOR TEMPORAL SCALABILITY		
picture mux order	3	THE NUMBER OF ADDED LAYER PICTURES BEFORE FIRST BASE LAYER PICTURE
picture mux factor	3	THE NUMBER OF ADDED LAYER PICTURES BETWEEN BASE LAYERS
user data ( )		USER DATA ( )
user data	8	USER DATA

FIG. 5

CODE	NUMBER OF BITS	DESCRIPTION
group start code	32	GOP START CODE
time code	25	TIME CODE (HOUR, MINUTE, SECOND, PICTURE)
closed gop	1	FLAG INDICATING INDEPENDENCY OF GOP
broken link	1	VALIDITY FLAG OF B-PICTURE BEFORE I-PICTURE IN GOP

FIG. 6

CODE	NUMBER OF BITS	DESCRIPTION
extension data (1)		EXTENSION DATA (1)
user data ( )		USER DATA ( )
user data	8	USER DATA

FIG. 7

CODE	NUMBER OF BITS	DESCRIPTION
picture start code	32	PICTURE START CODE
temporal reference	10	DISPLAY ORDER OF PICTURES IN GOP (modulo 1024)
picture coding type	3	PICTURE-CODING TYPE (I, B, P)
vbv delay	16	AMOUNT OF VBV DELAY UNTIL DECODING STARTS

FIG. 8

CODE	NUMBER OF BITS	DESCRIPTION
f code [s] [t]	4	RANGE OF MOTION VECTORS IN FORWARD AND BACKWARD DIRECTIONS (s), AND HORIZONTAL AND VERTICAL DIRECTIONS (t)
intra dc precision	2	DC COEFFICIENT PRECISION OF INTRA MB
picture structure	2	PICTURE STRUCTURE (FRAME, FIELD)
top field first	1	DISPLAY FIELD SETTING
frame pred frame dct	1	FRAME PREDICTION + FRAME DCT FLAG
concealment motion vectors	1	INTRA MB CONCEALMENT MV FLAG
q scale type	1	QUANTIZER SCALE TYPE (LINEAR, NON-LINEAR)
intra vlc format	1	INTRA MB VLC TYPE
alternate scan	1	SCANNING TYPE (ZIGZAG, ALTERNATE)
repeat first field	1	2:3 PULL-DOWN FIELD REPEAT
chroma 420 type	1	SAME VALUE AS progressive frame IN 4:2:0
progressive frame	1	PROGRESSIVE FRAME FLAG

FIG. 9

CODE	NUMBER OF BITS	DESCRIPTION
extension data (2)		EXTENSION DATA (2)
quant matrix extension ( )		QUANTIZER MATRIX EXTENSION ( )
intra quantiser matrix [64]	8*64	INTRA MB QUANTIZER MATRIX
non intra quantiser matrix [64]	8*64	NON-INTRA MB QUANTIZER MATRIX
chroma intra quantiser matrix [64]	8*64	CHROMA INTRA QUANTIZER MATRIX
chroma non intra quantiser matrix [64]	8*64	CHROMA NON-INTRA QUANTIZER MATRIX
copyright extension ( )		COPYRIGHT EXTENSION ( )
picture display extension ( )		PICTURE DISPLAY EXTENSION ( )
picture spatial scalable extension ( )		PICTURE SPATIAL SCALABLE EXTENSION ( )
spatial temporal weight code table index	2	UPSAMPLING SPATIAL TEMPORAL WEIGHT CODE TABLE
lower layer progressive frame	1	LOWER LAYER PROGRESSIVE IMAGE FLAG
lower layer deinterlaced field select	1	LOWER LAYER FIELD SELECTION
picture temporal scable extension ( )		PICTURE TEMPORAL SCALABLE EXTENSION ( )
reference select code	2	SELECTION OF REFERENCE IMAGE
forward temporal reference	10	PICTURE NUMBER OF FORWARD PREDICTIVE LOWER LAYER
backward temporal reference	10	PICTURE NUMBER OF BACKWARD PREDICTIVE LOWER LAYER
user data ( )		USER DATA ( )
user data ( )	8	USER DATA

FIG. 10

CODE	NUMBER OF BITS	DESCRIPTION
slice start code	32	SLICE START CODE + SLICE VERTICAL POSITION
slice vertical position extension	3	SLICE VERTICAL POSITION EXTENSION (>2800 LINES)
priority breakpoint	7	DATA PARTITIONING BREAKPOINT
quantiser scale code	5	QUANTIZER SCALE CODES (1 to 31)
intra slice	1	INTRA SLICE FLAG
macroblock ( )		MACROBLOCK DATA ( )

FIG. 11

CODE	NUMBER OF BITS	DESCRIPTION
macroblock escape	11	MB ADDRESS EXTENSION (>33)
macroblock address increment	1 - 11	DIFFERRENCE BETWEEN CURRENT MB ADDRESS AND PREVIOUS MB ADDRESS
macroblock modes ( )		MACROBLOCK MODE ( )
macroblock type	1 - 9	MB CODING TYPE (MC, Coded, etc.)
spatial temporal weight code	2	UPSAMPLING SPATIAL TEMPORAL WEIGHT CODE
frame motion type	2	MOTION COMPENSATION TYPE FOR FRAME STRUCTURE
field motion type	2	MOTION COMPENSATION TYPE FOR FIELD STRUCTURE
dct type	1	DCT TYPE (FRAME, FIELD)
quantiser scale code	5	MB QUANTIZER SCALE CODES (1 to 31)
motion vectors (*s*)		MOTION VECTORS (*s*)
motion vertical field select [r] [s]	1	SELECTION OF REFERENCE FIELD FOR PREDICTION
motion vector (*r, s*)		MOTION VECTOR (*r, s*)
motion code [*r*] [*s*] [*t*]	1 - 11	FUNDAMENTAL DIFFERENTIAL MOTION VECTOR
motion residual [*r*] [*s*] [*t*]	1 - 8	RESIDUAL DIFFERENTIAL VECTOR
dmvector [*t*]	1 - 2	DUAL PRIMING DIFFERENTIAL VECTOR
coded block pattern ( )		CBP
block (*i*)		BLOCK DATA ( )

FIG. 12

CODE	NUMBER OF BITS	DESCRIPTION
dct dc size luminance	2 - 9	DCT LUMINANCE DC COEFFICIENT DIFFERENTIAL SIZE
dct dc differential	1 - 11	DCT LUMINANCE DC COEFFICIENT DIFFERENTIAL VALUE
dct dc size chrominance	2 - 10	DCT CHROMINANCE DC COEFFICIENT DIFFERENTIAL SIZE
dct dc differential	1 - 11	DCT CHROMINANCE DC COEFFICIENT DIFFERENTIAL VALUE
First DCT coefficient	3 - 24	FIRST NON-ZERO COEFFICIENT OF NON-INTRA BLOCK
Subsequent DCT coefficient	2 - 24	SUBSEQUENT DCT COEFFICIENT
End of block	2 or 4	FLAG INDICATING END OF DCT COEFFICIENT IN BLOCK

FIG. 13A

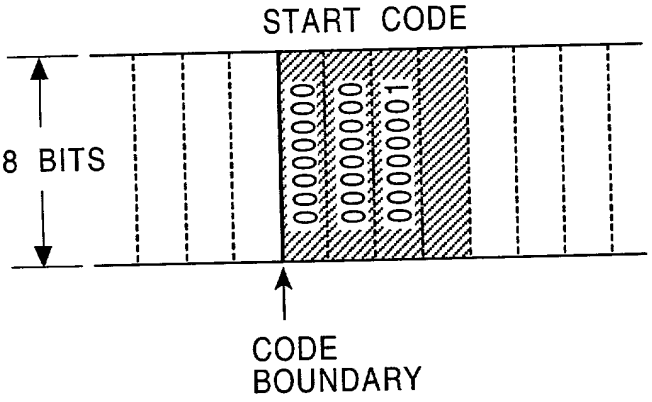


FIG. 13B

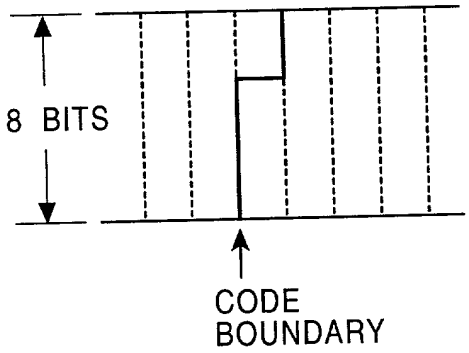


FIG. 14

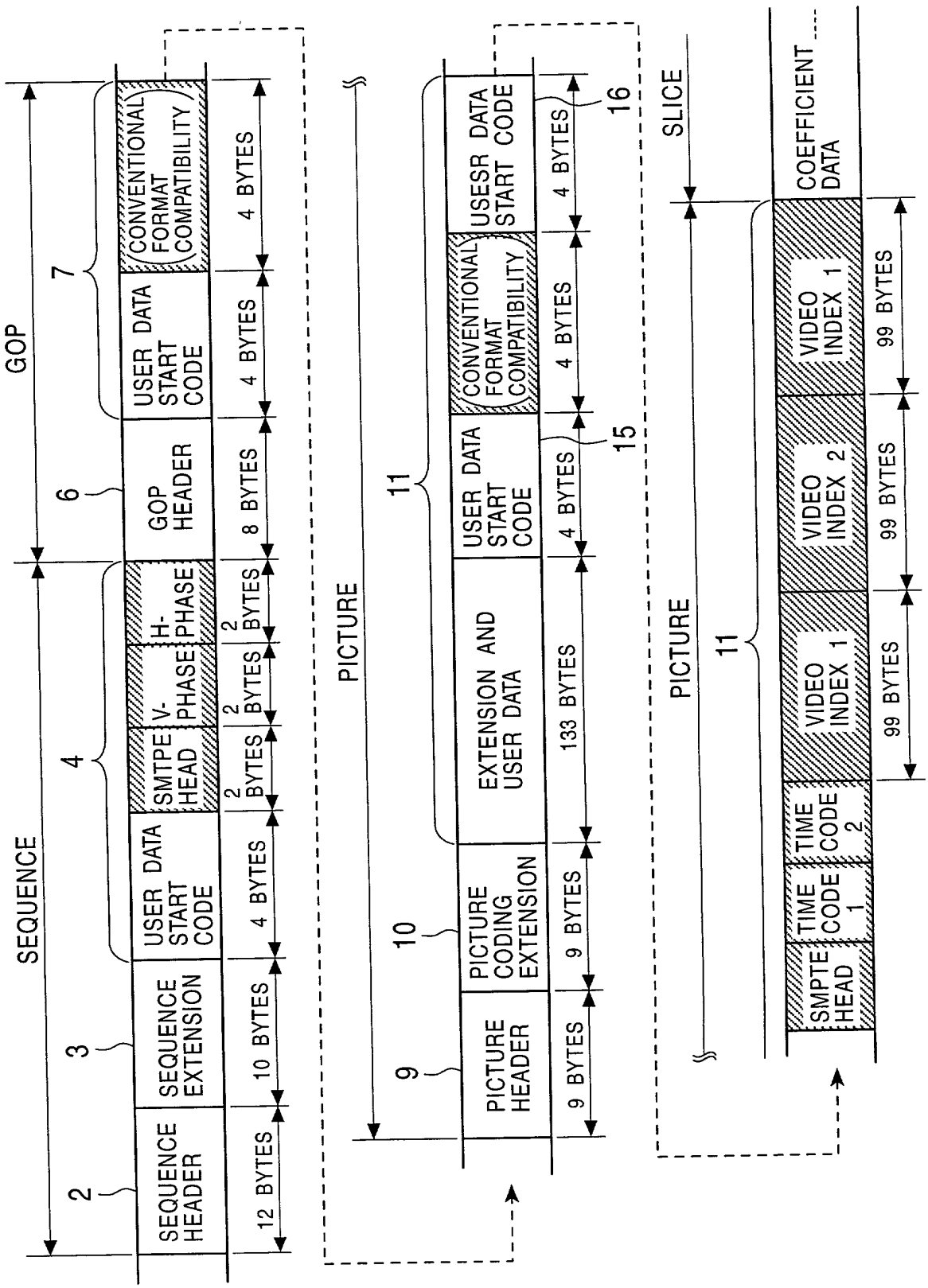

SEQUENCE
GOP
PICTURE
PICTURE
SLICE
2
3
4
6
7
9
10
11
15
16
SEQUENCE HEADER
SEQUENCE EXTENSION
USER DATA START CODE
SMTPE HEAD
V-PHASE
H-PHASE
GOP HEADER
USER DATA START CODE
CONVENTIONAL FORMAT COMPATIBILITY
12 BYTES
10 BYTES
4 BYTES
2 BYTES
2 BYTES
2 BYTES
8 BYTES
4 BYTES
4 BYTES
PICTURE HEADER
PICTURE CODING EXTENSION
EXTENSION AND USER DATA
USER DATA START CODE
CONVENTIONAL FORMAT COMPATIBILITY
USESR DATA START CODE
9 BYTES
9 BYTES
133 BYTES
4 BYTES
4 BYTES
4 BYTES
SMPTE HEAD
TIME CODE 1
TIME CODE 2
VIDEO INDEX 1
VIDEO INDEX 2
VIDEO INDEX 1
COEFFICIENT DATA
99 BYTES
99 BYTES
99 BYTES

FIG. 15

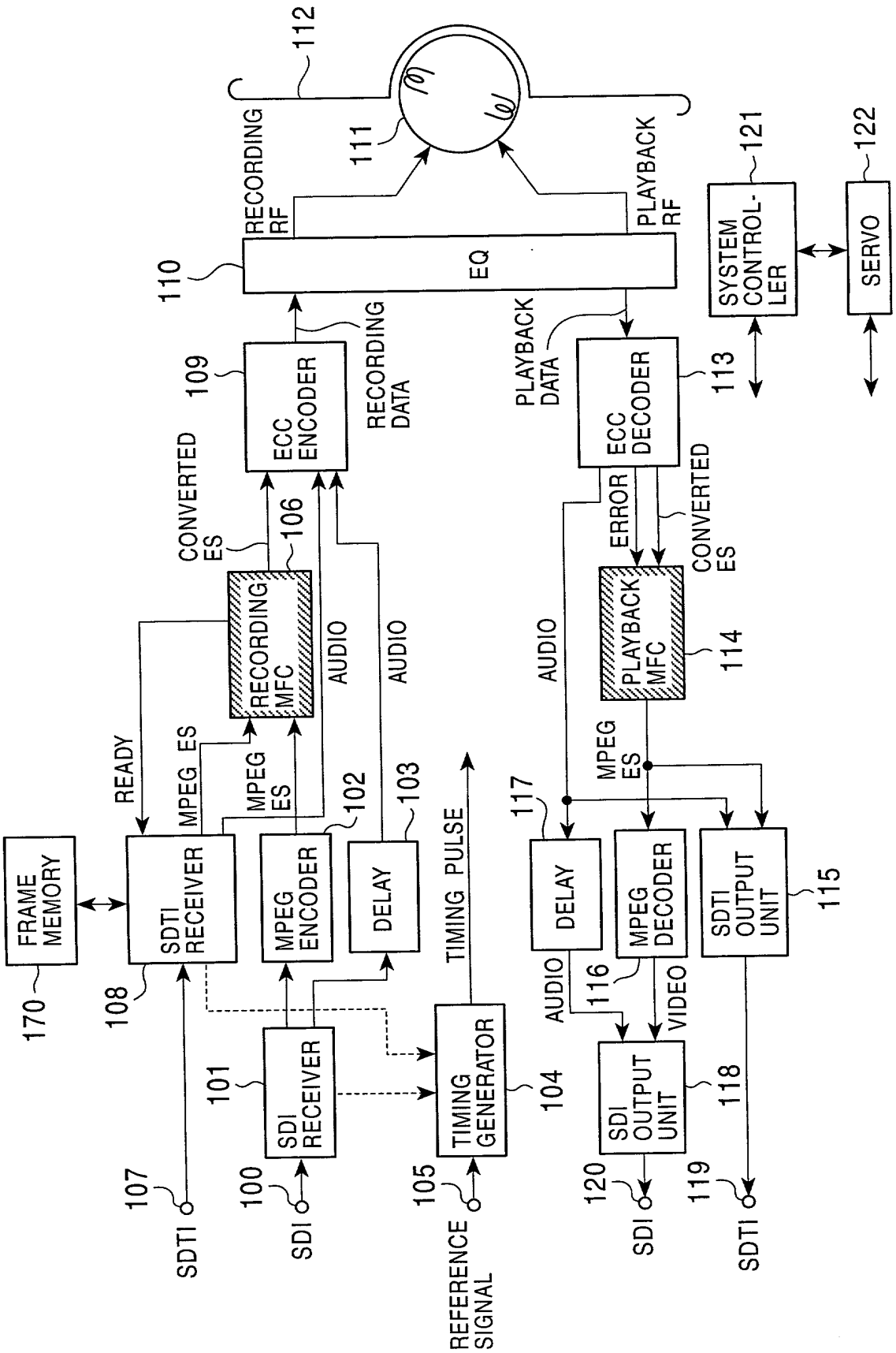

112
111
RECORDING RF
PLAYBACK RF
110
EQ
SYSTEM CONTROL-LER
121
SERVO
122
109
ECC ENCODER
RECORDING DATA
PLAYBACK DATA
ECC DECODER
113
CONVERTED ES
106
ERROR
CONVERTED ES
RECORDING MFC
PLAYBACK MFC
114
AUDIO
AUDIO
AUDIO
READY
MPEG ES
MPEG ES
MPEG ES
102
103
117
FRAME MEMORY
SDTI RECEIVER
MPEG ENCODER
DELAY
TIMING PULSE
DELAY
MPEG DECODER
SDTI OUTPUT UNIT
115
170
108
101
104
AUDIO
116
VIDEO
SDI RECEIVER
TIMING GENERATOR
SDI OUTPUT UNIT
118
107
100
105
120
119
SDTI
SDI
REFERENCE SIGNAL
SDI
SDTI

FIG. 16

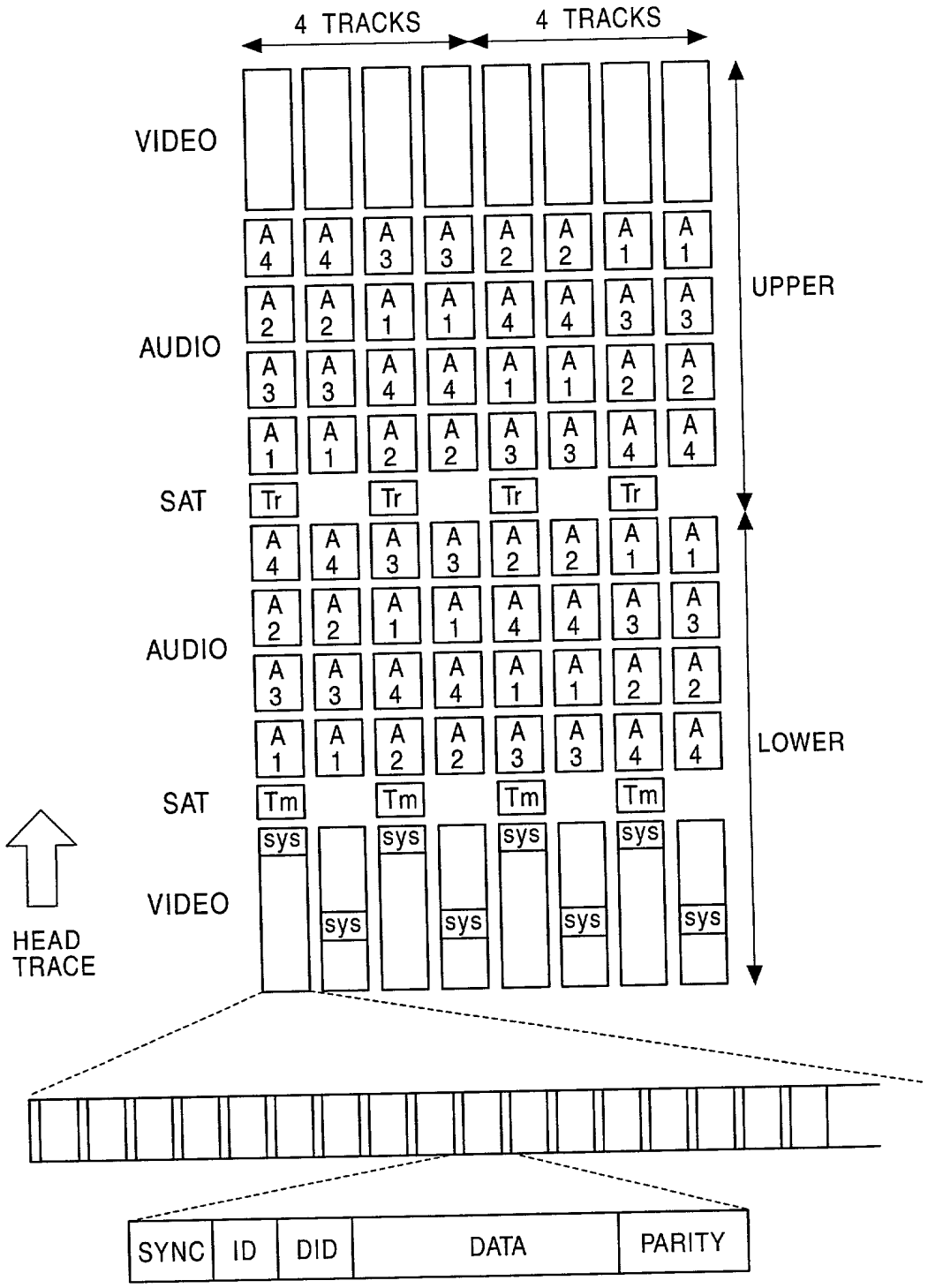

4 TRACKS
4 TRACKS
VIDEO
AUDIO
SAT
AUDIO
SAT
VIDEO
UPPER
LOWER
HEAD TRACE
Tr
Tm
sys
SYNC
ID
DID
DATA
PARITY

FIG. 17A

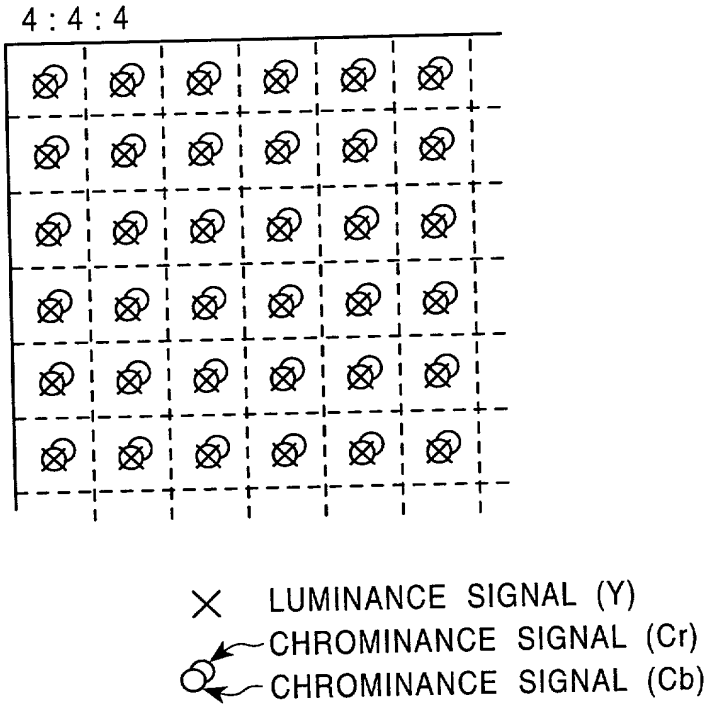


FIG. 17B

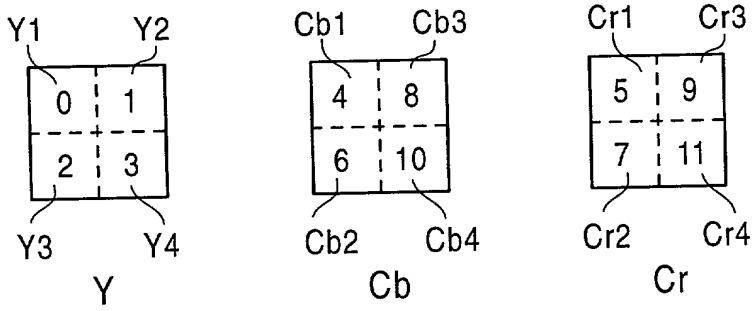


FIG. 18A

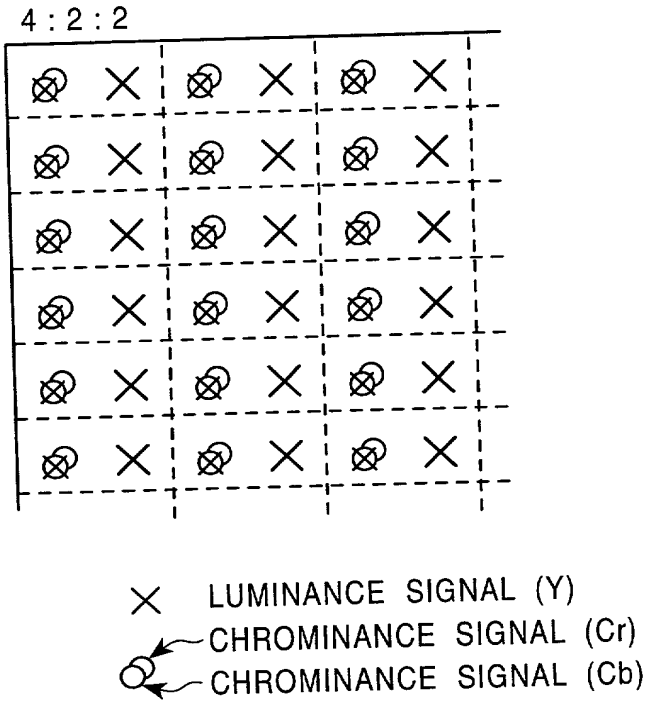


FIG. 18B

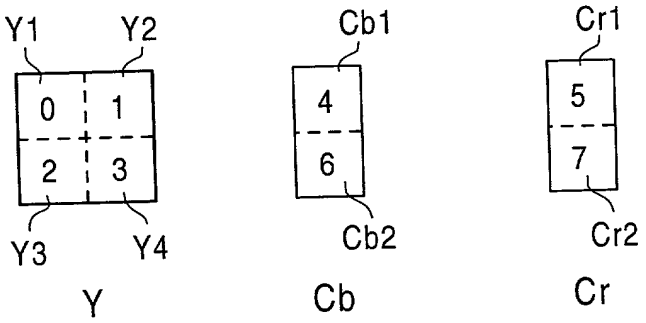


FIG. 19A

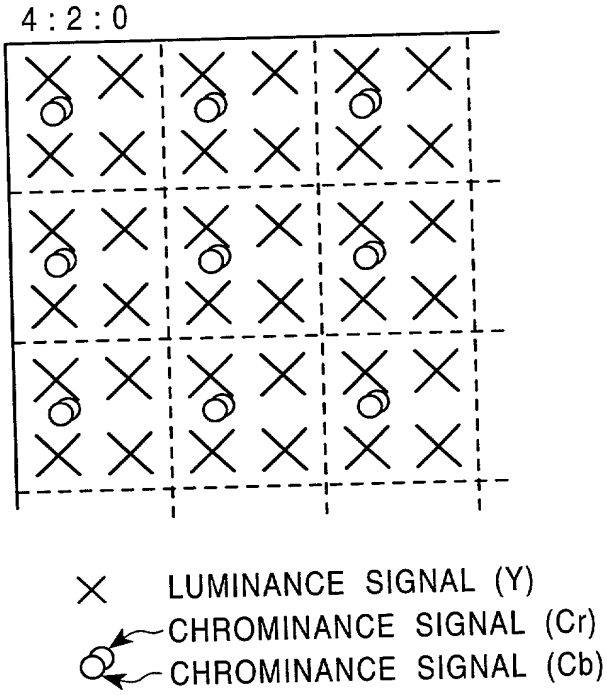


FIG. 19B

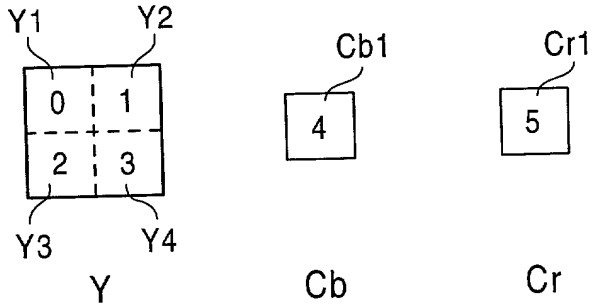


FIG. 20A

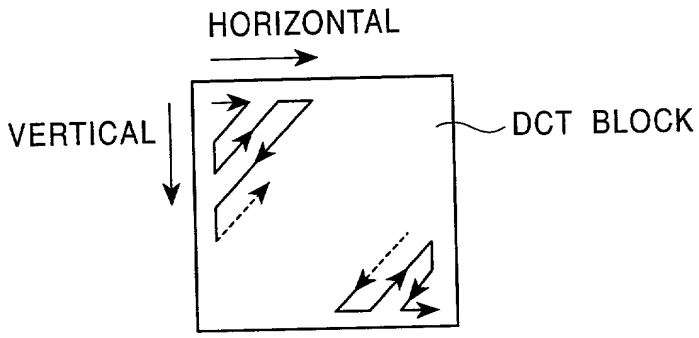


FIG. 20B

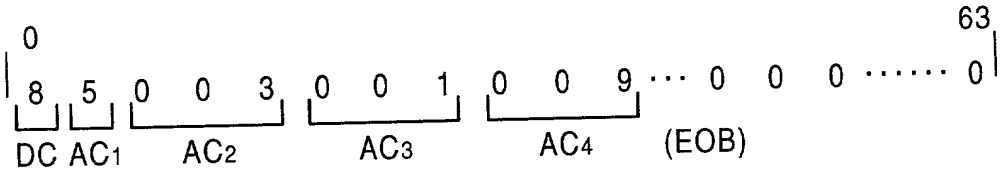


FIG. 21A

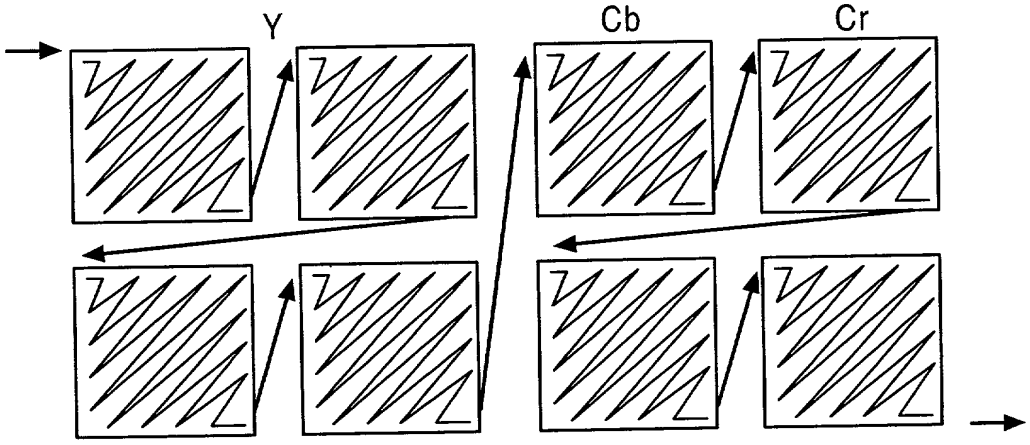


FIG. 21B

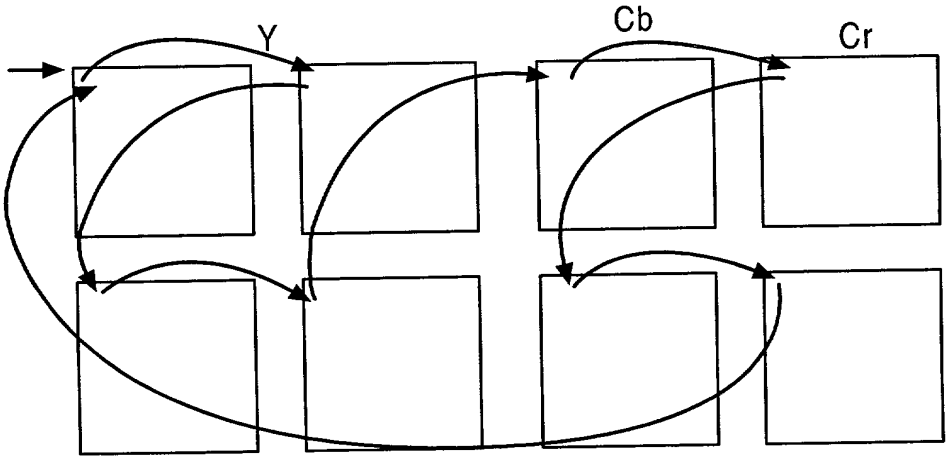


FIG. 22A

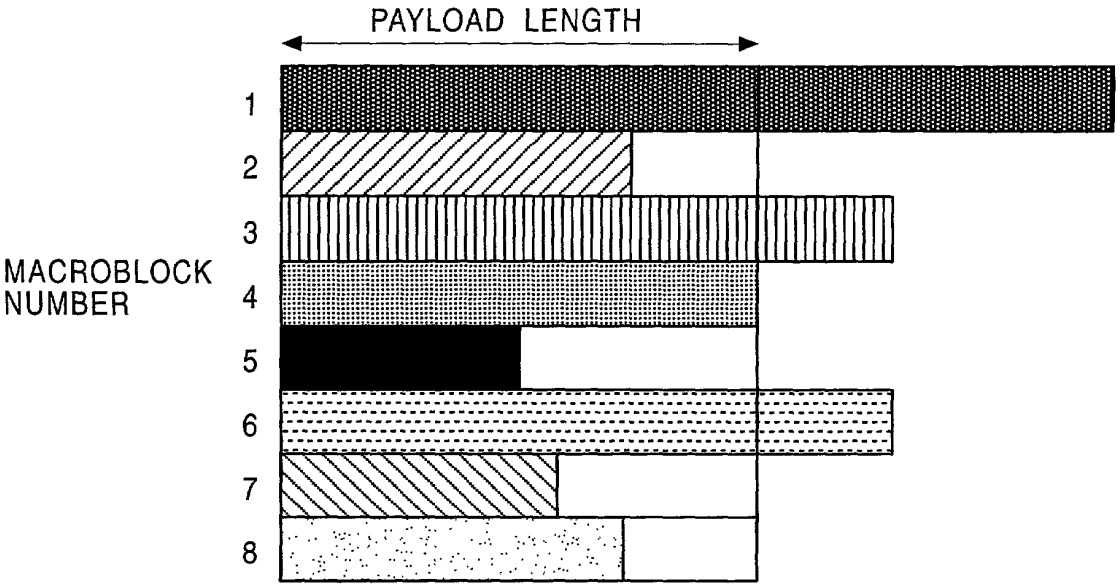


FIG. 22B

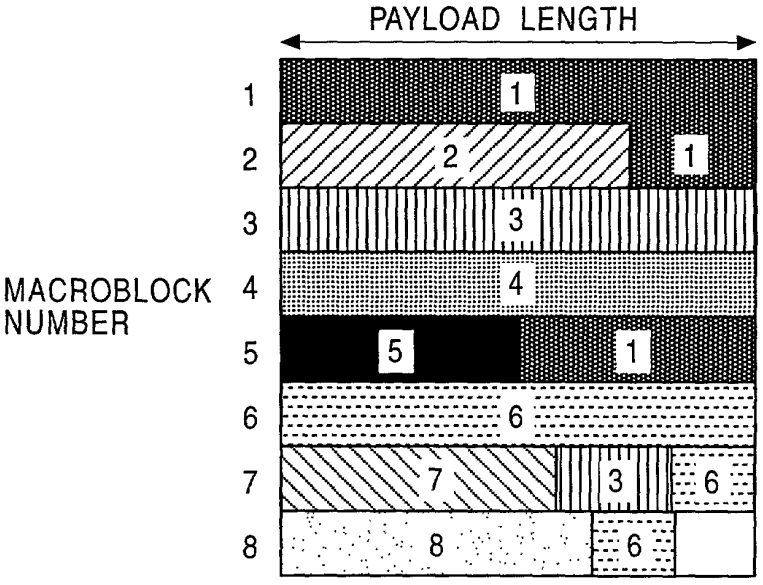


FIG. 23A

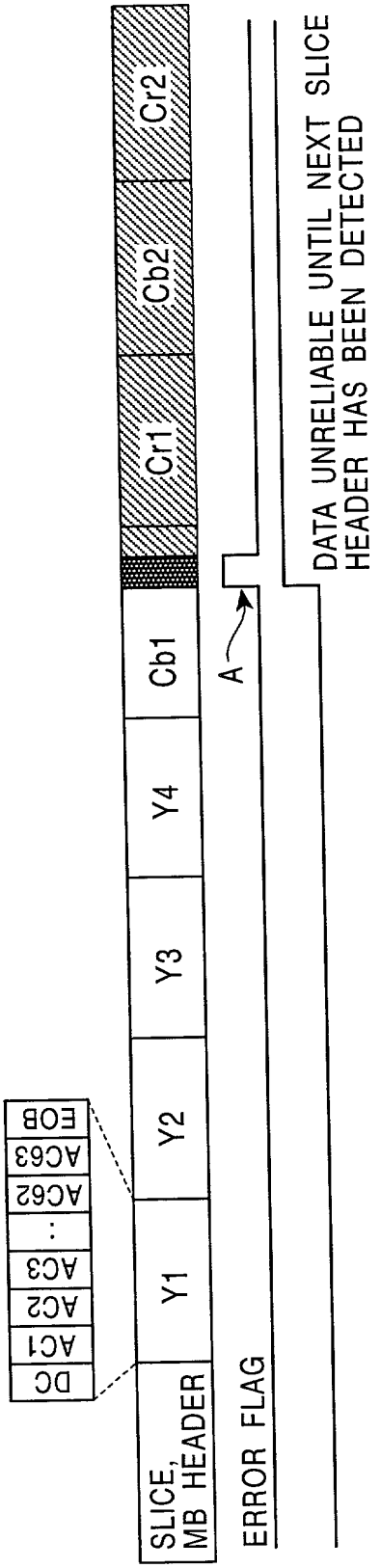


FIG. 23B

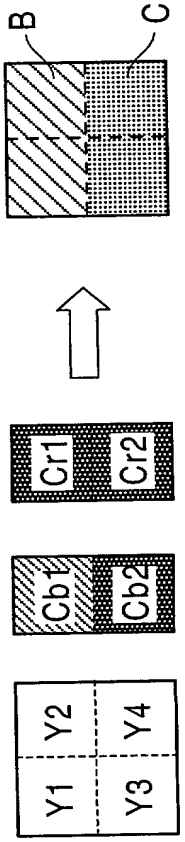


FIG. 24A

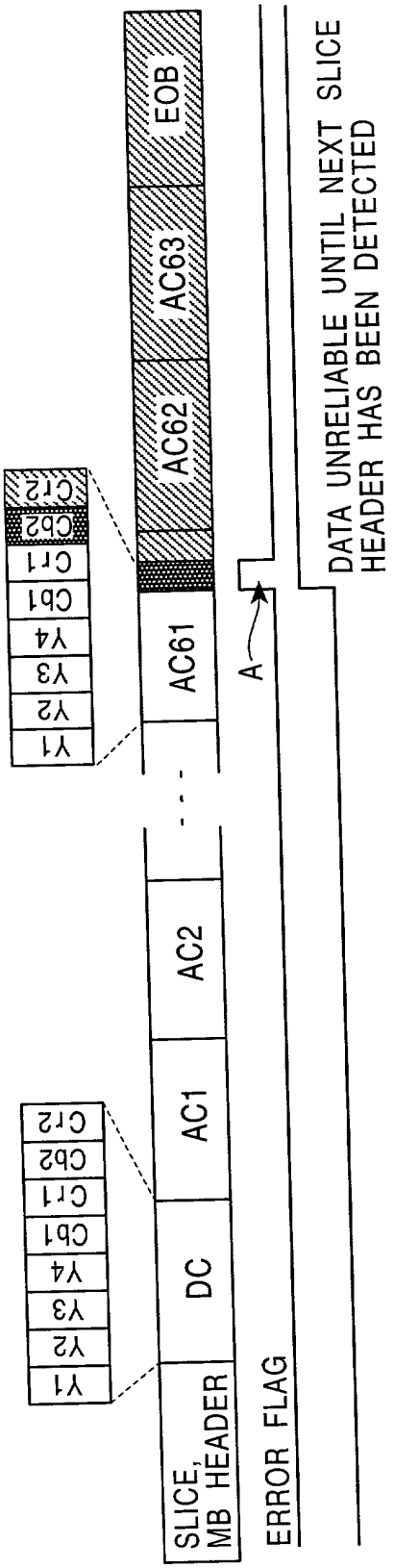
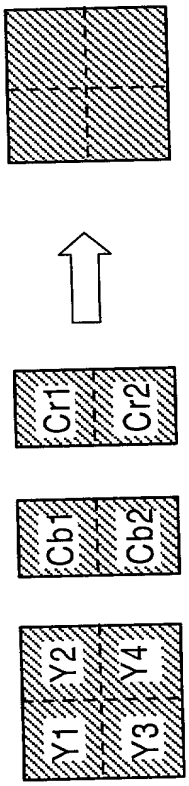


FIG. 24B



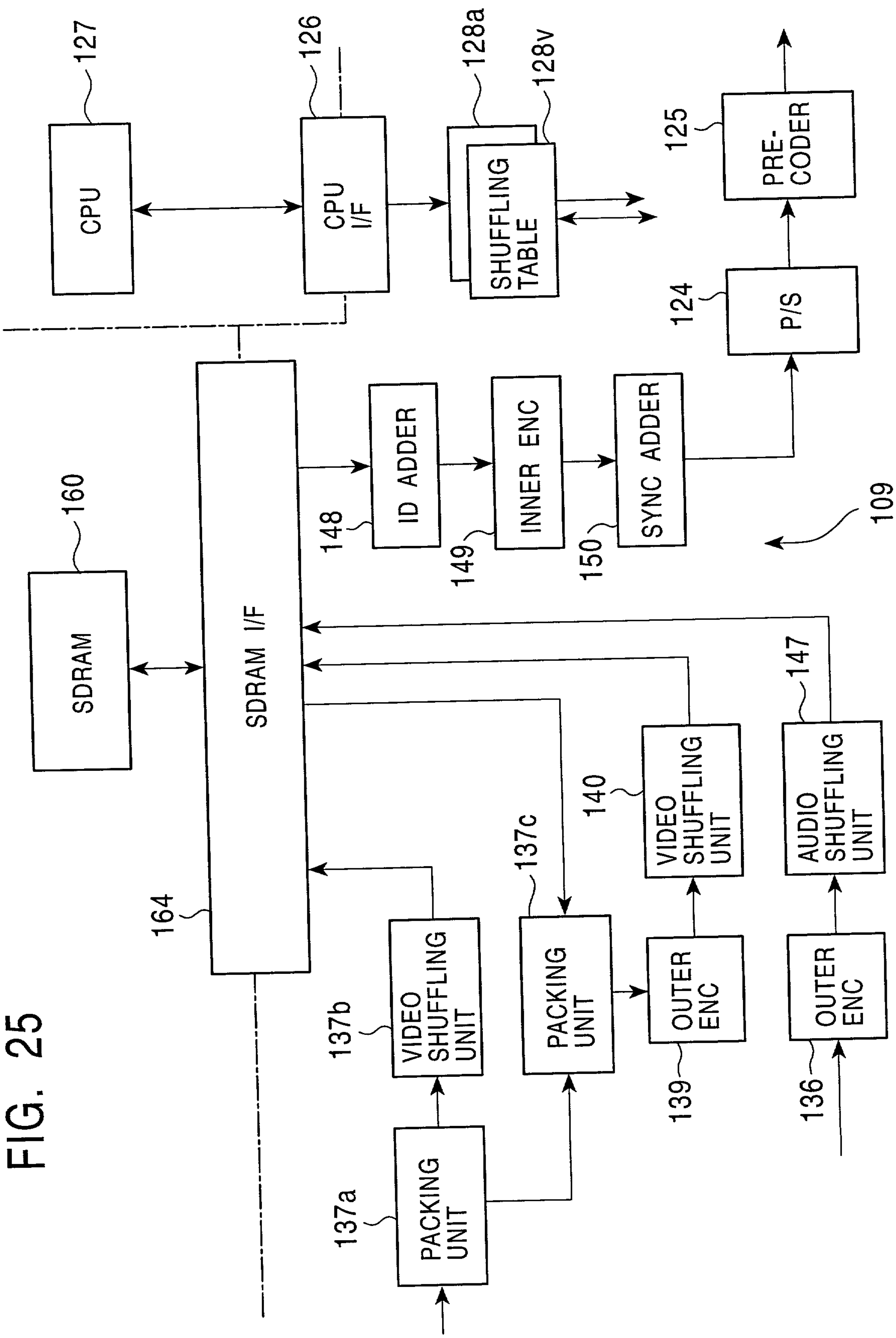

127
CPU
126
CPU I/F
128a
128v
SHUFFLING TABLE
125
PRE-CODER
124
P/S
160
SDRAM
SDRAM I/F
164
148
ID ADDER
149
INNER ENC
150
SYNC ADDER
109
147
AUDIO SHUFFLING UNIT
140
VIDEO SHUFFLING UNIT
137c
PACKING UNIT
137b
VIDEO SHUFFLING UNIT
137a
PACKING UNIT
139
OUTER ENC
136
OUTER ENC

FIG. 25

FIG. 26

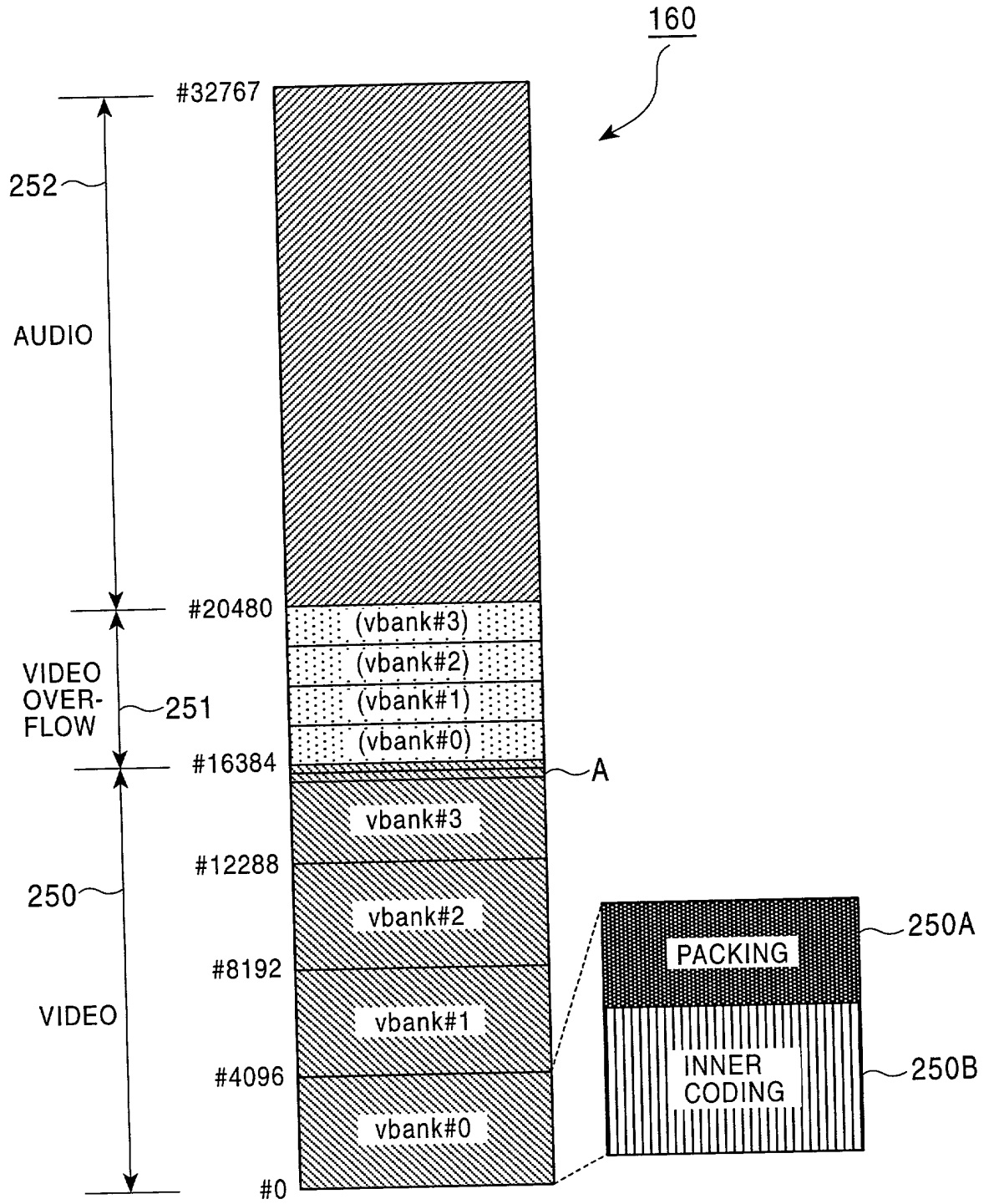

160
#32767
252
AUDIO
#20480
VIDEO
OVER-
FLOW
251
#16384
250
VIDEO
#12288
#8192
#4096
#0
(vbank#3)
(vbank#2)
(vbank#1)
(vbank#0)
A
vbank#3
vbank#2
vbank#1
vbank#0
PACKING
250A
INNER
CODING
250B

FIG. 27A

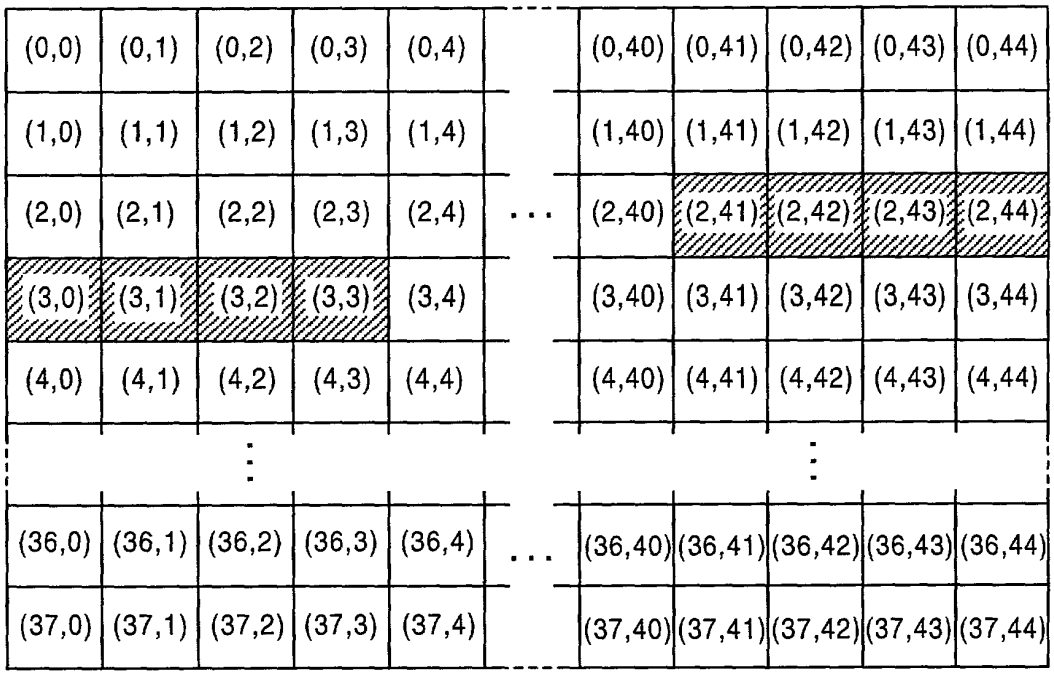


FIG. 27B

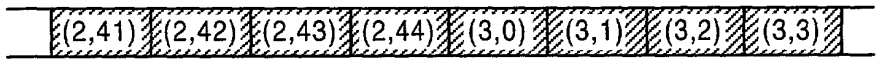


FIG. 27C

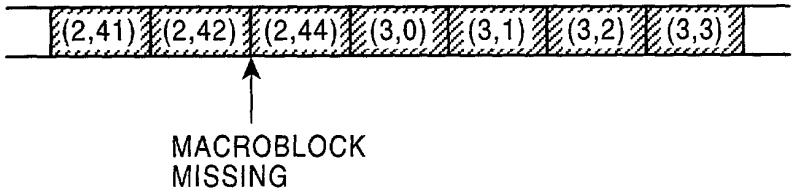


FIG. 27D

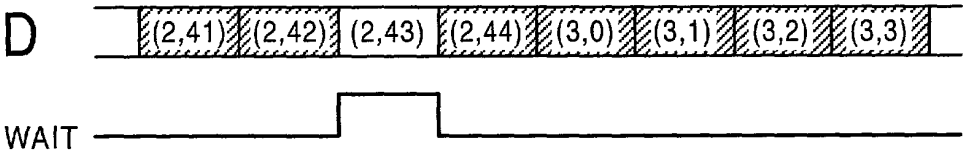


FIG. 28

ITEM	VALUE	CONTENT
slice_start_code	32'h00_00_01_03	(03 IS CREATED FROM mb_row ON SCREEN)
quantizer_scale_code	5'b1 0000	
extra_bit_slice	1'b0	
macroblock_escape	11'b0000_0001_000	(CREATED FROM mb_column ON SCREEN)
macroblock_address_increment	8'b0000_1010	(CREATED FROM mb_column ON SCREEN)
macroblock_type	1'b1	
dct_type	1'b1	
dct_dc_size_luminance	3'b100	Y1 DC
eob	4'b0110	
dct_dc_size_luminance	3'b100	Y2 DC
eob	4'b0110	
dct_dc_size_luminance	3'b100	Y3 DC
eob	4'b0110	
dct_dc_size_luminance	3'b100	Y4 DC
eob	4'b0110	
dct_dc_size_chrominance	2'b00	Cb1 DC
eob	4'b0110	
dct_dc_size_chrominance	2'b00	Cr1 DC
eob	4'b0110	
dct_dc_size_chrominance	2'b00	Cb2 DC
eob	4'b0110	
ct_dc_size_chrominance	2'b00	Cr2 DC
eob	4'b0110	

FIG. 29A

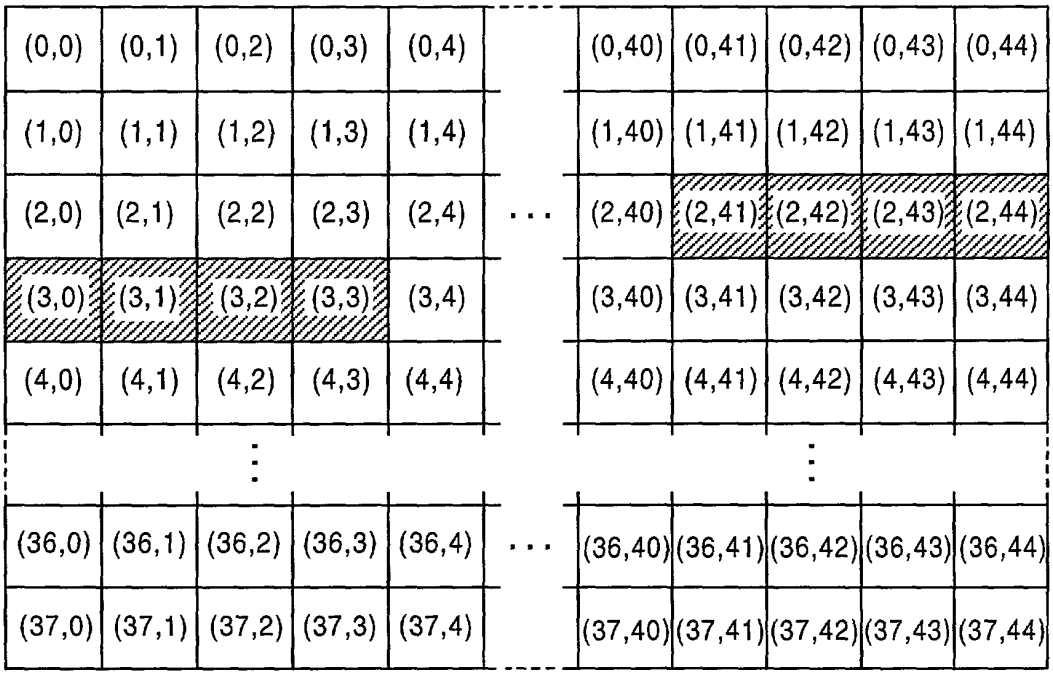


FIG. 29B

FIG. 29C

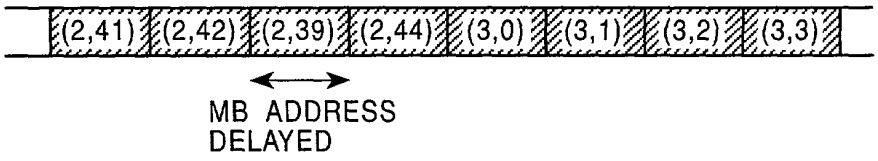


FIG. 29D

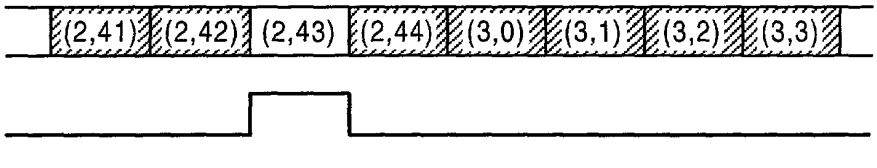


FIG. 30

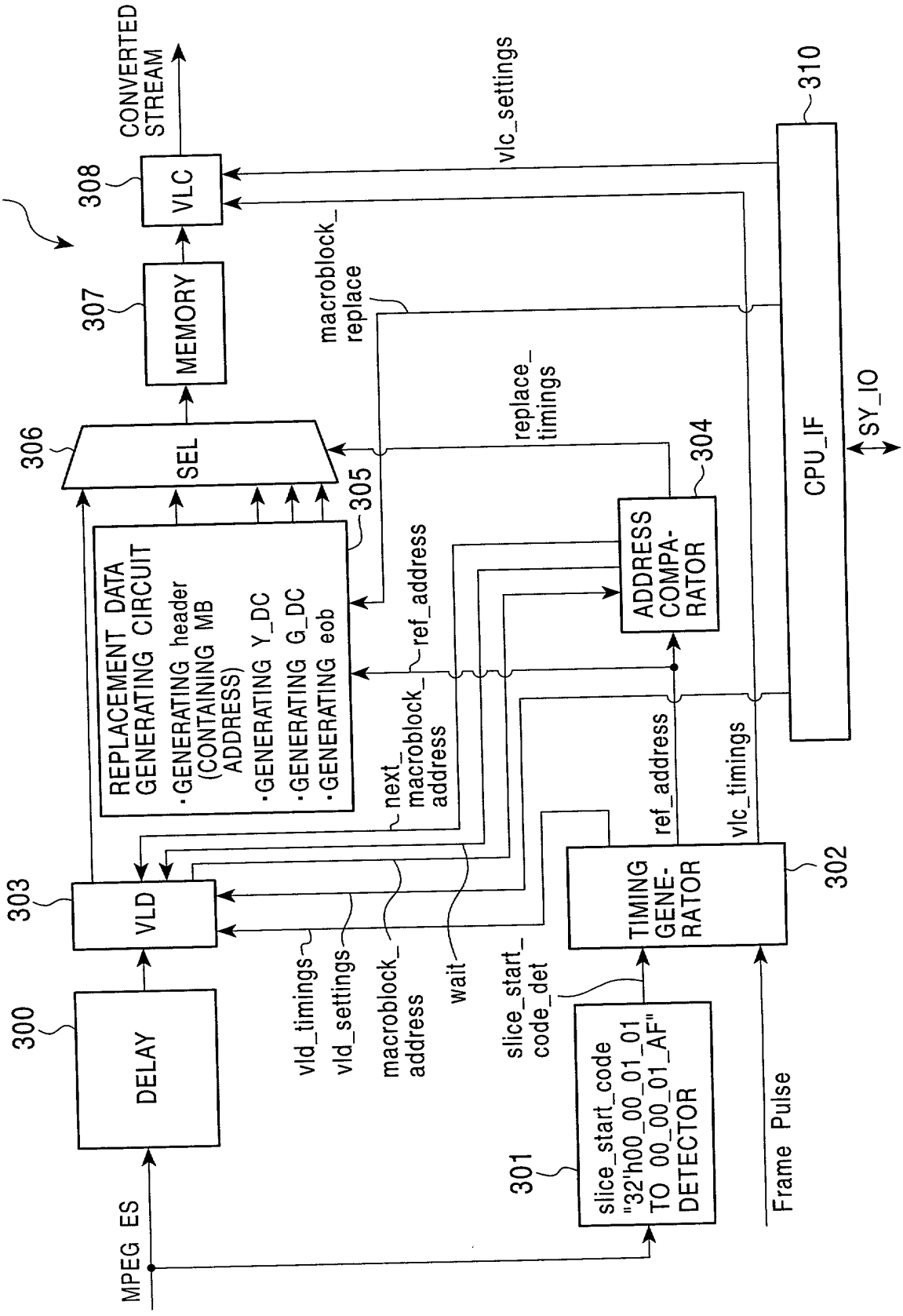

106
CONVERTED STREAM
308
VLC
vlc_settings
310
307
MEMORY
macroblock_ replace
306
SEL
305
REPLACEMENT DATA GENERATING CIRCUIT
·GENERATING header (CONTAINING MB ADDRESS)
·GENERATING Y_DC
·GENERATING G_DC
·GENERATING eob
replace_ timings
304
ADDRESS COMPA-RATOR
CPU_IF
SY_IO
ref_address
next_ macroblock_ address
303
VLD
300
DELAY
vld_timings
vld_settings
macroblock_ address
wait
slice_start_ code_det
TIMING GENE-RATOR
ref_address
vlc_timings
302
301
slice_start_code "32'h00_00_01_01 TO 00_00_01_AF" DETECTOR
MPEG ES
Frame Pulse

FIG. 31

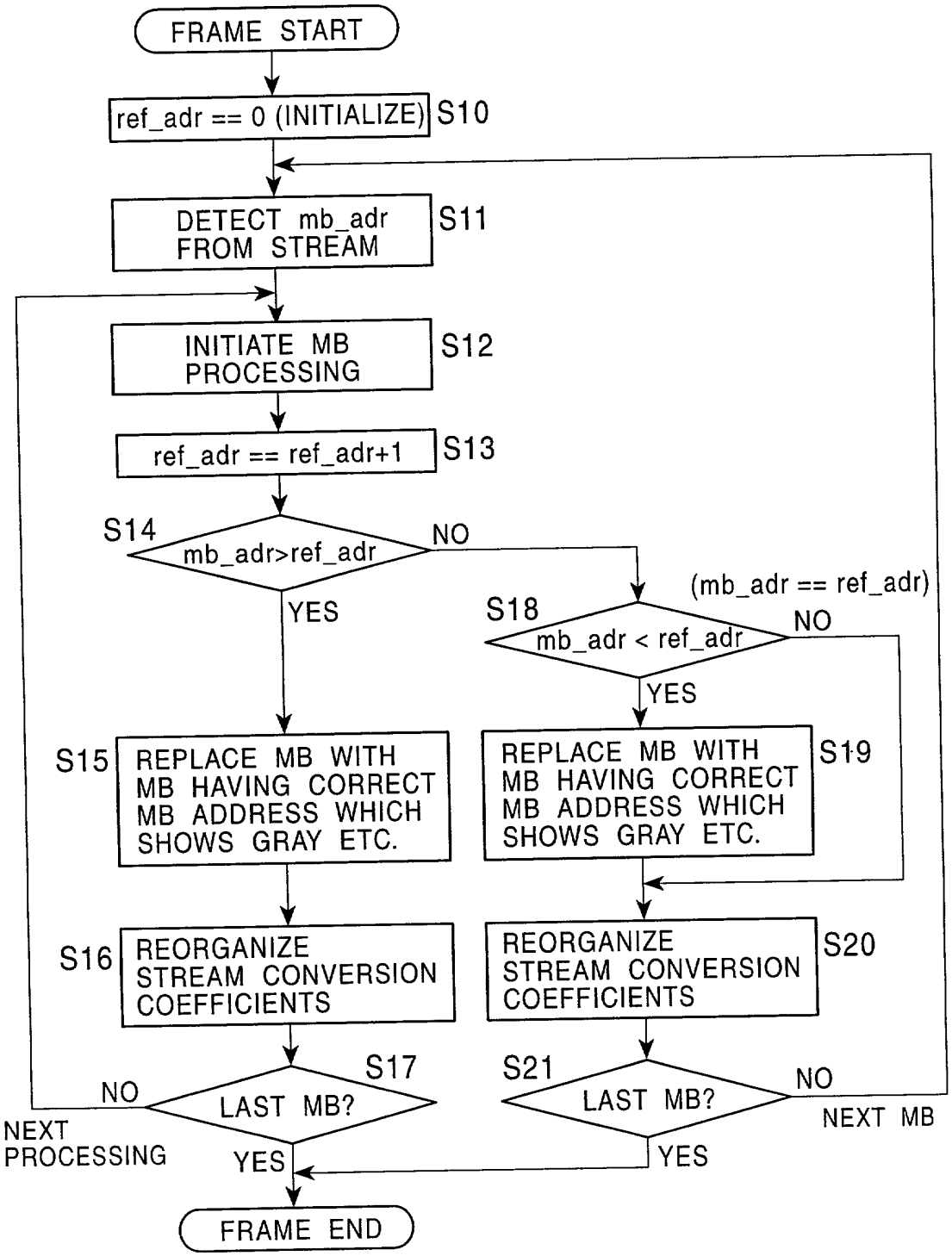

FRAME START
ref_adr == 0 (INITIALIZE)
S10
DETECT mb_adr FROM STREAM
S11
INITIATE MB PROCESSING
S12
ref_adr == ref_adr+1
S13
S14
mb_adr>ref_adr
NO
YES
(mb_adr == ref_adr)
S18
mb_adr < ref_adr
NO
YES
S15
REPLACE MB WITH MB HAVING CORRECT MB ADDRESS WHICH SHOWS GRAY ETC.
S19
REPLACE MB WITH MB HAVING CORRECT MB ADDRESS WHICH SHOWS GRAY ETC.
S16
REORGANIZE STREAM CONVERSION COEFFICIENTS
S20
REORGANIZE STREAM CONVERSION COEFFICIENTS
S17
NO
LAST MB?
NEXT PROCESSING
YES
S21
LAST MB?
NO
NEXT MB
YES
FRAME END

FIG. 32A

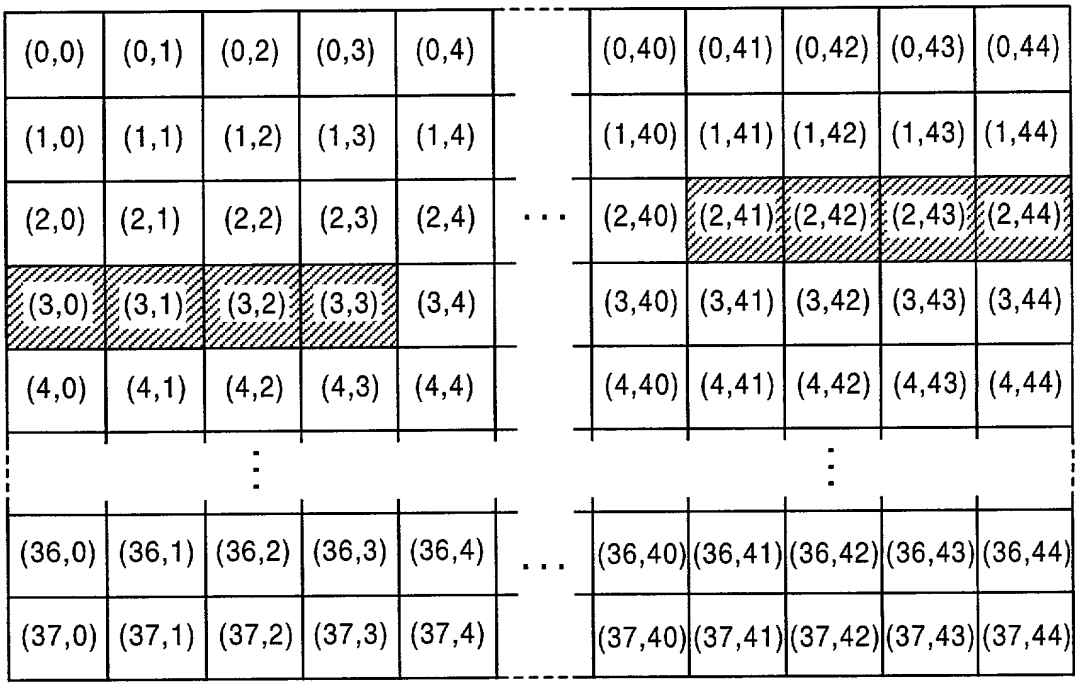


FIG. 32B

FIG. 32C